

WHAT IS CLAIMED IS:

1. A book page document image reading apparatus comprising:

means for reading an image of a first size of a spread of book pages of a book so as to create image data when a central binding section of the book is aligned to a reference position;

means for changing a size of the image read by said means for reading from the first size to a second size;

means for storing the image data after a size change made by said means for changing; and

means for writing the image data to memory within a first memory range of the first size, and writing image data to memory within a second memory range of the second size after said size change.

2. The book page document image reading apparatus according to claim 1, further comprising means for using the central binding section of said book as a reference when reading the image.

3. The book page document image reading apparatus according to claim 1, wherein said image data is output to at least one of a computer workstation and a printer.

4. The book page document image reading apparatus according to claim 1, wherein a size of a memory used in said means for storing to accommodate said image data is changed in accordance with a change in zoom magnitude.

5. The book page document image reading apparatus according to claim 1, wherein said book page document image reading apparatus is configured to interface to an external memory device.

6. The book page document image reading apparatus according to claim 5, wherein said external memory device comprises at least one of a workstation, a frame memory, a DRAM module, and a SCSI compatible device.

7. The book page document image reading apparatus according to claim 1, wherein said means for reading includes means for automatically correcting for a deformation of a spread of book pages.

8. The book page document image reading apparatus according to claim 1, wherein a zoom magnitude is at least 71%.

9. The book page document image reading apparatus according to claim 1, wherein a zoom magnitude is less than or equal to 141%.

10. The book page document image reading apparatus according to claim 1, wherein a zoom magnitude is in an inclusive range of at least 71% through 141%.

11. A book page document image reading apparatus comprising:  
means for reading an image of a first size of a spread of book pages of a book so as to create image data when a central binding section of the book is aligned to a reference position;

means for changing a size of the image read by said means for reading from the first size to a second size;

means for storing the image data after a size change made by said means for changing; and

means for deciding a start position in said storage means where storage of the image data after the size change is started according to a magnifying factor when a book page document is read by said means for reading.

12. A book page document image reading apparatus according to claim 11, wherein,

when an image is copied with a magnifying factor of M, a position P to start storage of said image data is expressed by an expression that follows to the start position for storage of image data in said storage means when an image of a book page document is copied with a same size or with a reduced size:

$$P_{mm} = 210 (1 - 1 / M).$$

13. The book page document image reading apparatus according to claim 11, further comprising means for using the central binding section of said book as a reference when reading the image.

14. The book page document image reading apparatus according to claim 11, wherein said image data is output to at least one of a computer workstation and a printer.

15. The book page document image reading apparatus according to claim 11, wherein a size of a memory used in said means for storing to accommodate said image data is changed in accordance with a change in zoom magnitude.

16. The book page document image reading apparatus according to claim 11, wherein said book page document image reading apparatus is configured to interface to an external memory device.

17. The book page document image reading apparatus according to claim 11, wherein said external memory device comprises at least one of a workstation, a frame memory, a DRAM module, and a SCSI compatible device.

18. The book page document image reading apparatus according to claim 11, wherein said means for reading includes means for automatically correcting for a deformation of a spread of book pages.

19. The book page document image reading apparatus according to claim 11, wherein a zoom magnitude is at least 71%.

20. The book page document image reading apparatus according to claim 11, wherein a zoom magnitude is less than or equal to 141%.

21. The book page document image reading apparatus according to claim 11, wherein a zoom magnitude is in an inclusive range of at least 71% through 141%.

22. A book page document image reading apparatus comprising:  
means for reading an image of a spread of book pages and creating image data;  
means for changing a size of an image read by said means for reading;  
means for storing the image data after a size change by said means for changing; and  
means for generating a warning signal in a case where a range for storage of the image data after said size change in said means for storing is out of a prespecified range, or in a case where a range for reading image data from said means for storing is out of the prespecified range.

23. The book page document image reading apparatus according to claim 22, further comprising means for using the central binding section of said book as a reference when reading the image.

24. The book page document image reading apparatus according to claim 22, wherein said image data is output to at least one of a computer workstation and a printer.

25. The book page document image reading apparatus according to claim 22, wherein a size of a memory used in said means for storing to accommodate said image data is changed in accordance with a change in zoom magnitude.

26. The book page document image reading apparatus according to claim 22, wherein said book page document image reading apparatus is configured to interface to an external memory device.

27. The book page document image reading apparatus according to claim 22, wherein

said external memory device comprises at least one of a workstation, a frame memory, a DRAM module, and a SCSI compatible device.

28. The book page document image reading apparatus according to claim 22, wherein said means for reading includes means for automatically correcting for a deformation of a spread of book pages.

29. The book page document image reading apparatus according to claim 22, wherein a zoom magnitude is at least 71%.

30. The book page document image reading apparatus according to claim 22, wherein a zoom magnitude is less than or equal to 141%.

31. The book page document image reading apparatus according to claim 22, wherein a zoom magnitude is in an inclusive range of at least 71% through 141%.

32. A book page document image reading apparatus comprising:

a scanner configured to read an image of a first size of a spread of book pages of a book so as to create image data when a central binding section of the book is aligned to a reference position;

an image size changing device configured to change a size of the image read by said scanner from the first size to a second size;

a memory configured to store the image data after a size change by said image size changing device; and

a processor configured to write the image data to memory within a first memory range of the first size, and write the image data to memory within a second memory range of the second size after said size change.

33. The book page document image reading apparatus according to claim 32, further comprising means for using the central binding section of said book as a reference when

reading the image.

34. The book page document image reading apparatus according to claim 32, wherein said image data is output to at least one of a computer workstation and a printer.

35. The book page document image reading apparatus according to claim 32, wherein a size of a memory used in said means for storing to accommodate said image data is changed in accordance with a change in zoom magnitude.

36. The book page document image reading apparatus according to claim 32, wherein said book page document image reading apparatus is configured to interface to an external memory device.

37. The book page document image reading apparatus according to claim 32, wherein said external memory device comprises at least one of a workstation, a frame memory, a DRAM module, and a SCSI compatible device.

38. The book page document image reading apparatus according to claim 32, wherein said means for reading includes means for automatically correcting for a deformation of a spread of book pages.

39. The book page document image reading apparatus according to claim 32, wherein a zoom magnitude is at least 71%.

40. The book page document image reading apparatus according to claim 32, wherein a zoom magnitude is less than or equal to 141%.

41. The book page document image reading apparatus according to claim 32, wherein a zoom magnitude is in an inclusive range of at least 71% through 141%.

42. A book page document image reading apparatus comprising:  
a scanner configured to read an image of a first size of a spread of book pages of a book so as to create image data when a central binding section of the book is aligned to a

reference position;

an image size changing device configured to change a size of the image read by said scanner from the first size to a second size;

a memory configured to store the image data after a size change by said image size changing device; and

a processor configured to determine a starting position in the memory where storage of the image data after the size change is started according to a magnifying factor when a book page document is read by the scanner.

43. A book page document image reading apparatus according to claim 42, wherein, when an image is copied with a magnifying factor of  $M$ , a position  $P$  to start storage of said image data is expressed by an expression that follows to the start position for storage of image data in said memory when an image of a book page document is copied with a same size or with a reduced size:

$$P_{mm} = 210 (1 - 1 / M).$$

44. The book page document image reading apparatus according to claim 42, wherein when said book is opened and placed on a document base, an image of said book is read with a central binding section of said book as a reference.

45. The book page document image reading apparatus according to claim 42, wherein said image data is output to at least one of a computer workstation and a printer.

46. The book page document image reading apparatus according to claim 42, wherein a size of a memory used in said means for storing to accommodate said image data is changed in accordance with a change in zoom magnitude.

47. The book page document image reading apparatus according to claim 42, wherein said book page document image reading apparatus is configured to interface to an external

memory device.

48. The book page document image reading apparatus according to claim 42, wherein said external memory device comprises at least one of a workstation, a frame memory, a DRAM module, and a SCSI compatible device.

49. The book page document image reading apparatus according to claim 42, wherein said means for reading includes means for automatically correcting for a deformation of a spread of book pages.

50. The book page document image reading apparatus according to claim 42, wherein a zoom magnitude is at least 71%.

51. The book page document image reading apparatus according to claim 42, wherein a zoom magnitude is less than or equal to 141%.

52. The book page document image reading apparatus according to claim 42, wherein a zoom magnitude is in an inclusive range of at least 71% through 141%.

53. A book page document image reading apparatus comprising:

a scanner for reading an image of a spread of book pages;

an image size changing mechanism configured to change a size of an image read by said scanner;

a memory configured to store the image data after size change by said image size changing mechanism; and

a warning mechanism configured to generate a warning signal in a case where a range for storage of the image data after said size change in said memory is out of a prespecified range, or in a case where a range for reading image data from said memory is out of the prespecified range.

54. The book page document image reading apparatus according to claim 53, further



comprising means for using the central binding section of said book as a reference when reading the image.

55. The book page document image reading apparatus according to claim 53, wherein said image data is output to at least one of a computer workstation and a printer.

56. The book page document image reading apparatus according to claim 53, wherein a size of a memory used in said means for storing to accommodate said image data is changed in accordance with a change in zoom magnitude.

57. The book page document image reading apparatus according to claim 53, wherein said book page document image reading apparatus is configured to interface to an external memory device.

58. The book page document image reading apparatus according to claim 53, wherein said external memory device comprises at least one of a workstation, a frame memory, a DRAM module, and a SCSI compatible device.

59. The book page document image reading apparatus according to claim 53, wherein said means for reading includes means for automatically correcting for a deformation of a spread of book pages.

60. The book page document image reading apparatus according to claim 53, wherein a zoom magnitude is at least 71%.

61. The book page document image reading apparatus according to claim 53, wherein a zoom magnitude is less than or equal to 141%.

62. The book page document image reading apparatus according to claim 53, wherein a zoom magnitude is in an inclusive range of at least 71% through 141%.

63. A method for reading a book page document comprising steps of:

aligning a central binding section of a spread of book pages to a reference position;

reading an image of said spread of book pages so as to create image data;  
changing a size of the image read in said reading step;  
storing in memory the image data after size change made in said changing step; and  
identifying a range for storing the image data in memory when the book page  
document is read with a same size, which is different from a range for storing image data  
when a book page document is read with a changed image size.

64. A method for reading a book page document comprising steps of:  
aligning a central binding section of a book to a reference position;  
reading an image and creating image data of a spread of book pages of said book;  
changing a size of the image read in said reading step;  
storing the image data after changing a size of the image in said changing step; and  
determining a starting position where storage of the image data after said changing  
step is started in said storing step according to a magnifying factor when a book page  
document is read in said reading step.

65. A method for reading a book page document comprising steps of:  
reading an image of a spread of book pages and creating image data;  
changing a size of an image read in said reading step;  
storing the image data in memory after changing the size in said changing step; and  
generating a warning signal when a range for storage in the memory of the image data  
after said changing step is out of a prespecified range, or in a case where a range for reading  
image data stored in said storing step is out of the prespecified range.

66. A method of book page document image reading comprising the steps of:  
reading an image of a spread of book pages and creating image data;  
storing in memory the image data read in said reading step; and

setting a subset of image data to blank data when a memory address of said subset of image data is outside of a prespecified range.

67. A method for reading a book page document comprising steps of:

reading an image of a spread of book pages as creating image data;

changing a size of an image read in said reading step;

storing the image data in memory after changing the size in said changing step;

outputting the image data stored in said storing step;

turning a page of the book pages to a new page;

computing a range for storing image data in said storing step when the size of the

image is changed in said changing step;

detecting a page size of the new pages; and

comparing the page size detected in said page size detecting step to a range for storage of image data computed in said computing step when the image size is changed in said changing step.

68. A method for reading a book page document comprising steps of:

reading image and creating image data of a spread of book pages from an edge section of one of the book pages;

storing the image data;

turning to a new page of the spread of book pages from an edge section of the new page; and

suppressing a memory range for storage of a portion of the image data that corresponds with a portion of the edge section in a side of turning pages.

69. A method of book page document image reading comprising the steps of:

reading an image of a spread of book pages and creating image data of a book;

storing the image data in memory; and

turning a page of the book;

wherein said storing step stores said image data corresponding to a size of 2 or more pages in a case of maximum allowable page size of a book page document, and at a same time to a size of 2 maximum allowable pages of the book page document plus a size for a maximum thickness of a book, or less.

70. A method for reading book page document comprising steps of:

reading an image and creating image data of a spread of book pages from an edge section of one of the pages;

storing the image data read in said reading step;

turning a page of a spread of book pages from an edge section of another page that is not said one of the pages;

detecting a position for an edge section of a new page in a spread of book pages when the page is turned in said turning step; and

deciding a start point for storing image data of the spread of book pages in said storing step according to a detecting signal from said detecting step after detecting a position of a page edge section in the spread of book pages in said page edge section detecting step.

71. A book page document image reading apparatus comprising:

a reading means for reading an image of a spread of book pages located aligning a central binding section thereof to the reference position from an edge section of one of the pages;

an image size changing means for changing a size of an image read by said reading means;

a storage means for storing the read image data after size change by said image size

changing means; and

a processing means for making a range for storing image data in said storage means when a book page document is read with the same size different from a range for storing image data in said storage means when a book page document is read with a changed image size.

72. A book page document image reading apparatus according to claim 71, wherein said reading means comprises an image reading plate having a charge-coupled device for reading a document image, a video processing unit for executing from processing of an analog image signal from said image reading plate to an A/D converting, and a carriage for relaying between a signal-line of loaded system in a scan unit such as fluorescent lamps for lighting a document and an inverter power for the lamps, a heater, a thermistor, a fan, and a solenoid, and a wiring in the power line.

73. A book page document image reading apparatus according to claim 71, wherein said storage means is frame memory.

74. A book page document image reading apparatus according to claim 73, wherein said frame memory is consisted of 4 bits each dot according to a speed responding capability, and stores image data after each type of image processing is completed.

75. A book page document image reading apparatus according to claim 73, wherein a range for storing read image data in the auxiliary scanning direction in said frame memory is within approximately 455 mm and 7174 lines from the capacity of said frame memory to a range within 420 mm in A3, the maximum allowable size for a book page document.

76. A book page document image reading apparatus according to claim 71, wherein said reading means has a function for switching a read light path for a book page document provided in a lower side of the apparatus to a read light path for a sheet document provided in

an upper side thereof, and vice versa according to a position control for a mirror position to a light path.

77. A book page document image reading apparatus according to claim 71, wherein said reading means comprises 2 pieces of fluorescent lamps as a light source for exposing a book page document, 2 pieces of fluorescent lamps as a light source for exposing a sheet document, and an inverter circuit for 2 pieces of fluorescent lamps, and said inverter circuit for 2 pieces of fluorescent lamps lights up each lamps by switching the lamps to the fluorescent lamps for exposing a book page document when a book page document is to be read, and to the fluorescent lamps for exposing a sheet document when a sheet document is to be read respectively.

78. A book page document image reading apparatus according to claim 77, wherein said fluorescent lamps are synchronized to sampling for a read image of a charge-coupled device by said inverter circuit and are driven by 40 kHz so that a nonuniform density in a read image does not occur.

79. A book page document image reading apparatus according to claim 71, wherein image size changing in the auxiliary scanning direction by said image size changing means varies a scanning speed in accordance with the magnifying factor thereof.

80. A book page document image reading apparatus comprising:

a reading means for reading an image of a spread of book pages located aligning a central binding section thereof to the reference position from an edge section of one of the pages;

an image size changing means for changing a size of an image read by said reading means;

a storage means for storing the read image data after size change by said image size

changing means; and

a processing means for deciding a position where storage of the image data after size change is started in said storage means according to a magnifying factor when a book page document is read.

81. A book page document image reading apparatus according to claim 80, wherein said reading means comprises an image reading plate having a charge-coupled device for reading a document image, a video processing unit for executing from processing of an analog image signal from said image reading plate to an A/D converting, and a carriage for relaying between a signal line of loaded system in a scan unit such as fluorescent lamps for lighting a document and an inverter power a for the lamps, a heater, a thermistor, a fan, and a solenoid, and a wiring in the power line.

82. A book page document image reading apparatus according to claim 80, wherein said storage means is frame memory.

83. A book page document image reading apparatus according to claim 82, wherein said frame memory is consisted of 4 bits each dot according to a speed responding capability, and stores image data after each type of image processing is completed.

84. A book page document image reading apparatus according to claim 82, wherein a range for storing read image data in the auxiliary scanning direction in said frame memory is within approximately 455 mm and 7174 lines from the capacity of said frame memory to a range within 420 mm in A3, the maximum allowable size for a book page document.

85. A book page document image reading apparatus according to claim 80, wherein said reading means has a function for switching a read light path for a book page document provided in a lower side of the apparatus to a read light path for a sheet document provided in an upper side thereof, and vice versa according to a position control for a mirror position to a

light path.

86. A book page document image reading apparatus according to claim 80, wherein said reading means comprises 2 pieces of fluorescent lamps as a light source for exposing a book page document, 2 pieces of fluorescent lamps as a light source for exposing a sheet document, and an inverter circuit for 2 pieces of fluorescent lamps, and said inverter circuit for 2 pieces of fluorescent lamps lights up each lamps by switching the lamps to the fluorescent lamps for exposing a book page document when a book page document is to be read, and to the fluorescent lamps for exposing a sheet document when a sheet document is to be read respectively.

87. A book page document image reading apparatus according to claim 86, wherein said fluorescent lamps are synchronized to sampling for a read image of a charge-coupled device by said inverter circuit and are driven by 40 kHz so that a nonuniform density in a read image does not occur.

88. A book page document image reading apparatus according to claim 80, wherein image size changing in the auxiliary scanning direction by said image size changing means varies a scanning speed in accordance with the magnifying factor thereof.

89. A book page document image reading apparatus comprising:  
a reading means for reading an image of a spread of book pages;  
an image size changing means for changing a size of an image read by said reading means;

a storage means for storing the read image data after size change by said image size changing means; and

a warning means for generating an warning in a case where a range for storage of the read image data after said size change in said storage means is out of a prespecified range, or



in a case where a range for reading image data from said storage means is out of a prespecified range.

90. A book page document image reading apparatus according to claim 89, wherein said reading means comprises an image reading plate having a charge-coupled device for reading a document image, a video processing unit for executing from processing of an analog image signal from said image reading plate to an A/D converting, and a carriage for relaying between a signal line of loaded system in a scan unit such as fluorescent lamps for lighting a document and an inverter power for the lamps, a heater, a thermistor, a fan, and a solenoid, and a wiring in the power line.

91. A book page document image reading apparatus according to claim 89, wherein said storage means is frame memory.

92. A book page document image reading apparatus according to claim 91, wherein said frame memory is consisted of 4 bits each dot according to a speed responding capability, and stores image data after each type of image processing is completed.

93. A book page document image reading apparatus according to claim 91, wherein a range for storing read image data in the auxiliary scanning direction in said frame memory is within approximately 455 mm and 7174 lines from the capacity of said frame memory to a range within 420 mm in A3, the maximum allowable size for a book page document.

94. A book page document image reading apparatus according to claim 89, wherein said reading means has a function for switching a read light path for a book page document provided in a lower side of the apparatus to a read light path for a sheet document provided in an upper side thereof, and vice versa according to a position control for a mirror position to a light path.

95. A book page document image reading apparatus according to claim 80, wherein said reading means comprises 2 pieces of fluorescent lamps as a light source for exposing a book page document, 2 pieces of fluorescent lamps as a light source for exposing a sheet document, and an inverter circuit for 2 pieces of fluorescent lamps, and said inverter circuit for 2 pieces of fluorescent lamps lights up each lamps by switching the lamps to the fluorescent lamps for exposing a book page document when a book page document is to be read, and to the fluorescent lamps for exposing a sheet document when a sheet document is to be read respectively.

96. A book page document image reading apparatus according to claim 95, wherein said fluorescent lamps are synchronized to sampling for a read image of a charge-coupled device by said inverter circuit and are driven by 40 kHz so that a nonuniform density in a read image does not occur.

97. A book page document image reading apparatus according to claim 89, wherein image size changing in the auxiliary scanning direction by said image size changing means varies a scanning speed in accordance with the magnifying factor thereof.

98. A book page document image reading apparatus according to claim 80, wherein, when an image is copied with a magnifying factor of M, a position P to start storage of said image data is expressed by the following expression to the start position for storage of image data in said storage means when an image of a book page document is copied with the same size or with a reduced size:

$$P_{mm} = 210 (1 - 1 / M)$$

99. A book page document image reading apparatus according to claim 89, wherein said warning means comprises a liquid- crystal panel on which character display with a plurality of digits and a plurality of lines is possible.

100. A book page document image reading apparatus according to claim 89, wherein said warning means outputs an warning in a case where the read image data is overflown from the range for storage thereof in said storage means when an image of a book page document is copied with its enlarged size.

101. A book page document image reading apparatus according to claim 89, wherein, when an image is to be copied with its enlarged size, a last memory address in said storage means is detected, and at the point of that step, storage of image data into said storage means is completed.

102. A book page document image reading apparatus according to claim 89, wherein, when an image is copied with its reduced size, a rear edge of scanning is detected before the last address is detected in said storage means, and at the point of that step, storage of image data into said storage means is completed.

103. A book page document image reading apparatus according to claim 89, wherein said warning means compares a range for storage of image data in said storage means when an image is copied with its changed size to a page size of the book page document, and when the page size of said book page document is larger than said image data storage range, or when the page size of said book page document is overflows from said image data storage range even by a portion thereof, an image output is terminated before its operation.

104. A book page document image reading apparatus according to claim 89, wherein after preparation of image forming is terminated, and said warning means displays an warning thereon, and in a case where a clear signal for clearing said terminated state is not inputted and a start signal is again inputted thereto, it is assumed by system control that a portion of a page image should be outputted, and image forming and read operation are resumed therein.